

Contemporary Types of Consumer Packaging and Food Packaging

Yakov Verkhivker^{1*}, Elena Miroshnichenko¹ and Ella Altman²

¹Department of Food, Odessa National Academy of Food Technologies, Odessa, Ukraine

²Department of Cooling, Odessa National Academy of Food Technologies, Odessa, Ukraine.

Received May 18, 2018; Accepted June 08, 2018; Published December 27, 2018

ABSTRACT

Food products are packaged in different types of consumer containers. The properties of the container depend on the material from which it is made. One type of consumer packaging can withstand heat treatment, while others cannot stand. The article is devoted to the evaluation of the properties of various consumer packages for food products and considers what products can be filled into these packages. The article also evaluates the advantages and disadvantages of different types of packages and gives examples.

Keywords: Consumer containers, Food products, Construction materials, Properties

INTRODUCTION

The main conditions for successful sales of food products are not only high-quality goods and affordable value, but also a reliable, safe and aesthetically attractive packaging. For transportation, storage and identification of finished products, various materials are currently used - from traditional cardboard and glass to innovative polypropylene with a barrier layer [1,2].

The safety of packaging should be ensured:

- Sanitary and hygienic indicators used for its production of materials (the volume of number of chemicals released from the package, should not exceed the permissible concentrations);
- Mechanical characteristics (the packaging must withstand the compressive force, hydrostatic pressure, shocks, tensile load and other effects in accordance with current regulations;
- Indicators of chemical resistance (the package must be resistant to corrosion, oxidation, etc.)
- The requirements for the circulation of goods on the market (norms of storage, transportation, utilization).
- Consumer properties: to be practical (to provide convenient product recovery, compact packaging in the refrigerator when storing, etc.) and aesthetic (colorful, attractive).

Maximum fit the above requirements and are in high demand packaging of the following materials:

Glass

Consumer products from this traditional packaging material are characterized by absolute safety and environmental friendliness. They are used for storing alcoholic and non-alcoholic beverages, dairy and sour-milk products, sauces, ketchups, fish and meat raw materials, fruits (fruits, berries, vegetables), etc. Glassware provides reliable protection of the product against the corrosive effects of oxygen and microflora, and dark glass - also from sunlight. The disadvantages of such containers are its insufficient mechanical strength (high brittleness), significant weight (up to 30% of gross) and the relatively high cost of the container itself and its transportation.

Corresponding author: Yakov Verkhivker, Department of Food, Odessa National Academy of Food Technologies, Odessa, Ukraine, Email: yaverkhivker@gmail.com

Citation: Verkhivker Y, Miroshnichenko E & Altman E. (2018) Contemporary Types of Consumer Packaging and Food Packaging. International Journal of Bioprocess and Biotechnological Advancements, 4(1): 109-113.

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Plastic

This group includes products from polystyrene (cups for drinks, containers for various foods, regardless of the consistency), polypropylene (cups for sour-milk products, containers for meat products and semi-finished products), polyvinyl chloride (containers, bottles), polyethylene terephthalate (containers for salads, bulk products) and other polymers. Advantages of such materials are affordable, easy recycling of packaging and transportation, compatibility

with the production of a large range of different products. Therefore, plastic products are now used most widely. The main drawbacks of such a consumer container are the low environmental friendliness of some types of plastic (the exception is the biopolymers that are gaining popularity); plastic transmission of solar rays, as well as a sufficiently high gas permeability. Therefore, you need to carefully consider the choice of plastic packaging: take into account the features of the stored product and materials from which the container is made.



Metal

Containers made of tin, aluminum, other metals and their alloys are most widely used in the packaging of canned

products. It reliably protects products, products from mechanical impact and oxidation. Its disadvantages: high cost, small assortment and inadequate safety for human health (in violation of production and use technologies).



Paper and cardboard

These materials are light, compact, and environmentally friendly. They are used for the production of labels, wrapping paper, paper bags, glasses, plates, cardboard boxes

and boxes. The most widely used paper and cardboard are used for packaging confectionery products, as well as in the fast food industry. The disadvantages of such containers are insufficient protection from unpleasant odors, low moisture resistance and high cost.



Types of packaging for food products

Packaging for food products has the number of classifications. From the point of view of the destination, the packaging is divided into packaging equipment, shop and consumer, in construction - into bottles, containers, boxes, etc. By compactness, the packaging can be foldable, non-separable and collapsible. Depending on the materials used, and accordingly on the mechanical stability and the degree of strength, the packaging materials are divided into rigid, semi-rigid and soft.

Hard packaging

It retains its original shape and dimensions when filled with products. It is able to withstand mechanical influences during transportation and storage. Semi-rigid packaging retains the original shape only with minor loads and soft changes the shape and dimensions when filled with products. Depending on the production technology, the packaging can be blow molded, molded and pressed, thermoformed and welded. The universal materials that can be used in the production of containers for all of these technologies are polymers. The wide use possibilities make this material one of the most popular on the market.

Soft packaging

This type includes polymeric, paper (bags, wrapping paper) and fabric (twine, tape) materials. They are used for mechanically stable products, as they do not protect themselves sufficiently from damage. The advantages of such containers are low costs for purchase and delivery, as well as the possibility of sealing, preventing the oxidation of packaged food.

Rigid packaging

This category includes metal products (jars, containers, tubes), wood (boxes, trays, baskets, barrels), glass (bottles, cans) and polymer (barrels, boxes). Such packaging for food products provides protection of contents from mechanical influences, and in some cases - from exposure to oxygen, microflora, ultraviolet. It should be remembered that the rigid packaging has a high weight (25-30% of gross), as well as a significant cost.

Blown packaging

Suitable for packaging liquid, pasty, solid and loose products, carbonated beverages. It is made of various thermoplastics and represents preforms from which it is possible to blow out bottles when the preforms are heated up to 100°C.

Packing from gas-filled materials

Like containers (trays, cans, containers) is made of polymers that can withstand high loads and temperature differences. It is lightweight, economical, provides protection of goods

both from mechanical damage, and from moisture, exposure to microorganisms.

Combined packaging

Obtained by the joint use of polymers, paper or other materials (foil, cardboard). This container allows you to store products for a long time, preventing the loss of its consumer properties.

This type includes the following types of food packaging:

Flow and skin packing, shrink and stretch films. "Flow" type containers are obtained by applying molten polymer to the goods being packed and "skin" is formed using shrink films that are applied to the product (with or without a substrate). Then the material is heated, compressed and begins to tightly fit the goods. Such containers are used for packaging meat, fish, vegetables and fruits. Its lack - compatibility is not with all food; advantages - economy and convenience of transportation. Stretching films have a wider range of applications (compatible with most products) and do not require heating. But at the same stretch film cannot provide such a tight fit to the product, like "skin".

Packaging type "vitello" is a plastic cup, obtained as a result of thermoforming and inserted into a cylinder made of cardboard. Such packaging can be made using color printing, it is used for storing dairy products, sauces, seasonings.

The blister pack consists of a rigid substrate and a plastic case that has the shape of a hemisphere or repeats the shape of the product. Such case is made by thermoforming methods and attached to the substrate by welding, glue or staples. In a similar container can be stored canned fish, pates and other products.

Progress in the technological methods of packaging has made it possible to solve a number of problems facing manufacturers and suppliers of food products: make the appearance of the product more attractive, significantly extend the period of its storage without loss of consumer qualities and ensure the convenience of transportation of products. Modern packaging technologies include aseptic and vacuum packaging, as well as packaging in a gas-modified environment. For liquid products (juices, dairy and soy products), aseptic packaging technology is most often used. Vacuum packaging is suitable for meat and fish products, and for vegetables and fruits, packaging technology using gas-modified media is increasingly used.

Aseptic packaging

Consists of paper, aluminum and polyethylene, a combination of these materials provides reliable protection of the product from oxidation. During the treatment, the product and containers are sterilized (by different methods, separately from each other) and then the packaging is filled with products and sealed under sterile conditions. This

treatment allows to significantly extend the shelf life of goods without the use of preservatives.

Vacuum packaging of products

It is created with the help of special equipment and various materials: paper, polyethylene, foil, aluminum, etc. In the process of packaging goods from the package (or other packaging), air is pumped out. This allows you to protect food from the influence of the environment and extend its shelf life to 15-21 days. Disadvantages of the method are the loss of some useful properties and taste qualities of a number of products, the probability of anaerobic microorganisms developing within the package.

Packaging in a gas-modified environment

This technology was developed to eliminate the shortcomings that vacuum bags have. It provides filling the package with the product with a specially selected mixture of gases (for each type of products a separate composition is used). Filling of the package with gas is carried out after air evacuation. This technique makes it possible to slow down the degradation processes in the product and preserve its natural properties. Different methods and varieties of food packaging, structural solutions of packaging are required not only for the development of science and technology, but also for market conditions.

Some global trends in the field of packaging materials:

- Growth in demand for modern innovative packaging materials, including plastic (for example, polypropylene).
- Increase in the production of glass containers, corrugated packaging and packaging polymer films, as well as packaging's of combined type and packages with programmable properties.
- Increasing the ecological compatibility of the produced packaging (use in the production of biopolymers).
- The creation of reliable and simple packages with inscriptions in large print, which is explained by the growing number of older customers.
- Wide use of QR codes and other technical solutions in the field of information technology, allowing you to obtain the necessary information about the product using a mobile device.
- Active development of production in the field of recycling of packaging.

- Increasing the protective properties of packaging materials, reducing their material consumption.

At present, the most widely used packaging and packaging are used for the production of food products of long-term storage - canned food and are used to protect them from spoilage, the three main methods of preservation are:

- **Pasteurization** at temperatures below 100°C and **sterilization** at temperatures above 100°C in hermetically sealed containers;
- **Hot filling** at which the product heats up in a stream;
- **Aseptic preservation** with instant heating of the product to a high temperature (sterilization temperature) and cooling

Sterilization (pasteurization)

Hermetically sealed food container in the consumer packaging, sterilized at a temperature of 100-120°C. Depending on the sterilization temperature, the type of product, the type and size of the container, the duration of the process in autoclaves is 10-70 min. In a continuous pasteurizer, the product is aged at a pasteurization temperature of 75°C to 100°C for a certain pasteurization time. After sterilization, the canned food is cooled intensively.

Hot fillin

If the products are homogeneous, liquid or thick in consistence (juices, purees, tomato paste), they are produced from raw materials with a high active acidity, they can sometimes be preserved by hot filling. The product is heated and sterilized at high temperatures (85-95°C), then in a hot form, it is packed into a pre-prepared large metal, glass, polymer container (3 dm³ or 10 dm³ or more in capacity, sealed and without subsequent sterilization in special equipment. Due to the large volume of the product in the container, its slow self-cooling and its self-sterilization is at the same time, thanks to which microbiological stability is achieved. the temperature inside the container with the product gives rise processes, the result of which suffer organoleptic canned indicators (color, taste) and food value as well as the appearance of the container (available vacuum deformation metal cans).

In **aseptic preservation**, the product homogenous in consistency is briefly sterilized in a thin layer in a stream at elevated temperature, quickly cooled and packed under sterile conditions into sterile containers and sealed under aseptic conditions, neither autoclaves nor pasteurizers used. Method aseptic preservation has a number of significant advantages, one of them is maximum preservation of the

initial properties of the product (organoleptic, nutritional value) regardless of the volume of the container and a significant reduction in duration of heat treatment of the product [3-6].

In the food industry, other methods of preserving products from deterioration are used, for example, the use of antiseptics or preservatives of benzoic and sorbic acids and their potassium and sodium salts. These are chemicals that, in small doses in a product (not more than 0.1%), are toxic to microorganisms and are harmless to humans, they do not enter into chemical compounds with food components of the product, do not change its organoleptic properties. These preservatives do not react with the material of technological equipment and with cans, convenient to use; However, these substances cannot be removed from the product before consumption in food, and such products can be further sterilized in special equipment (autoclaves, pasteurizers). Also used for the production of long-term storage products are the combined methods of preserving, for example, combine the use of preservatives and the method of aseptic packaging of the product for polymer packaging's of the doy-pack type [7,8].

The use of new types of packaging and packaging, for example, for preserving food, opens today unlimited possibilities for obtaining a variety of high-quality food products. Appearing relatively recently in the practice of the food industry, retort bags allow to combine the advantages of "soft" packaging with the advantages of sterilized food products, since the packaging material from which they are made, not only takes up no more than 5% of the weight of the finished product, but also allows the final thermal treatment - sterilization of the product, at high temperatures in both steam and water environments [9].

It should be noted that the type of consumer food packaging used also affects the energy performance of the technology of production of these products. This applies not only to the cost share of the package itself in the full value of the goods, but also those energy costs that are necessary for the implementation of direct technological processes that allow obtaining a specific ready-to-sell and consumption products. The thermal regimes given in clearly illustrate this for a wide range of products produced by canneries [10,11].

Thus, when choosing packaging for the packaging of a product, it is necessary to take into account the variety of consumer properties of packaging, including ease of use, environmental friendliness and energy attractiveness for the manufacturer of the final product.

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